

SPHERICAL OUTER RACE BEARINGS FOR FREIGHT CAR TRUCKS

We normally use standard ball bearings in the journal boxes of our freight car trucks in 7 ½ inch gage railroading. Standard bearing design practices suggest one bearing race be a press fit (axle) and the other race be a slip fit (journal box bearing bore).

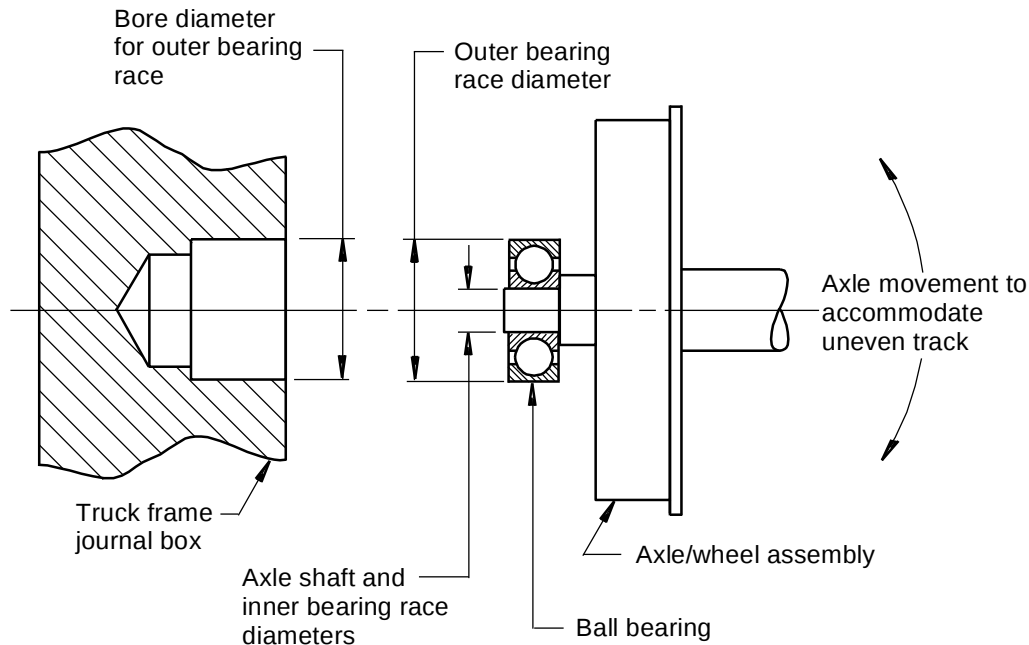


Figure 1 – Truck frame/wheel assembly interface

Figure 2a shows the inner bearing race pressed on a shaft that represents the truck axle. When the outer bearing race is slipped into the journal box bore the axle is ridged as can be seen in figure 2b.

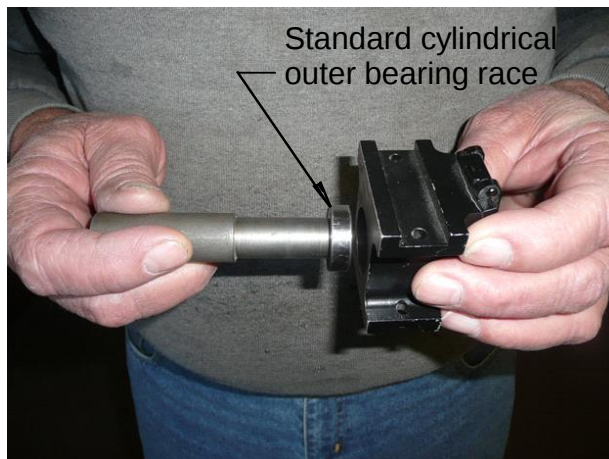


Figure 2a



Figure 2b

7 ½ gage railroad tracks are often uneven. A four wheel truck frame must therefore be flexible to prevent derailments. The ridged axle shown in figure 2b will not provide the required flexibility. This axle rigidity is often overcome by increasing the bore diameter for the outer bearing race in the journal box by 0.007 to 0.010 greater than the outer bearing race diameter. This allows the ball bearing to slop around in the journal box to provide some axle flexibility.

The SBSLRR shop purchased a Cincinnati Monoset grinding machine at a surplus auction as shown in figure 3.

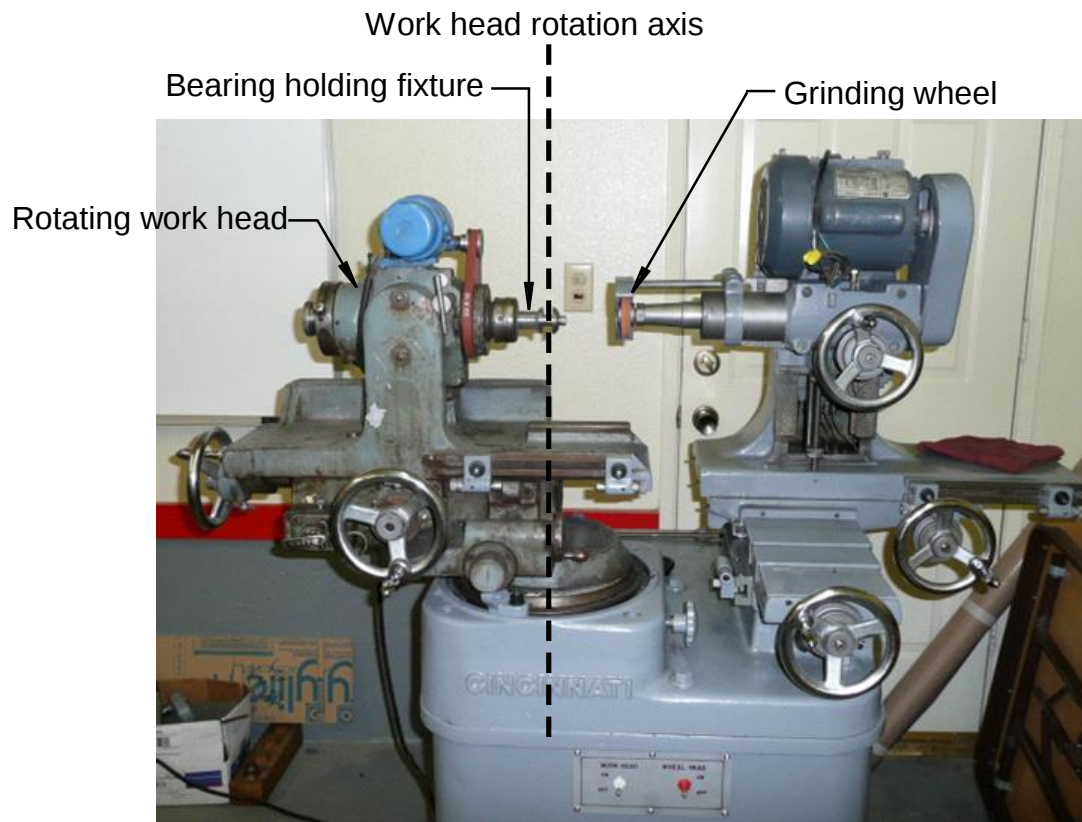


Figure 3 - Cincinnati Monoset grinding machine

This machine is ideally suited to grind the outer bearing race of a standard ball bearing to make it spherical. The bearing is retained in a fixture similar to that shown in figure 4.

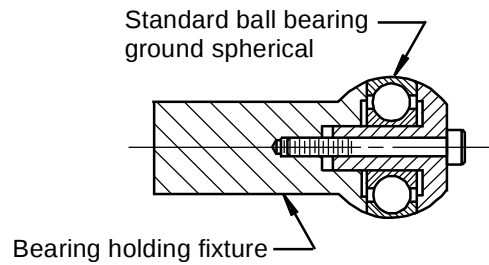


Figure 4 – Bearing holding fixture

The machine work head rotates the bearing holding fixture in the chuck. The work head can also rotate about the work head base axis to create the spherical outer race as shown in figure 5.

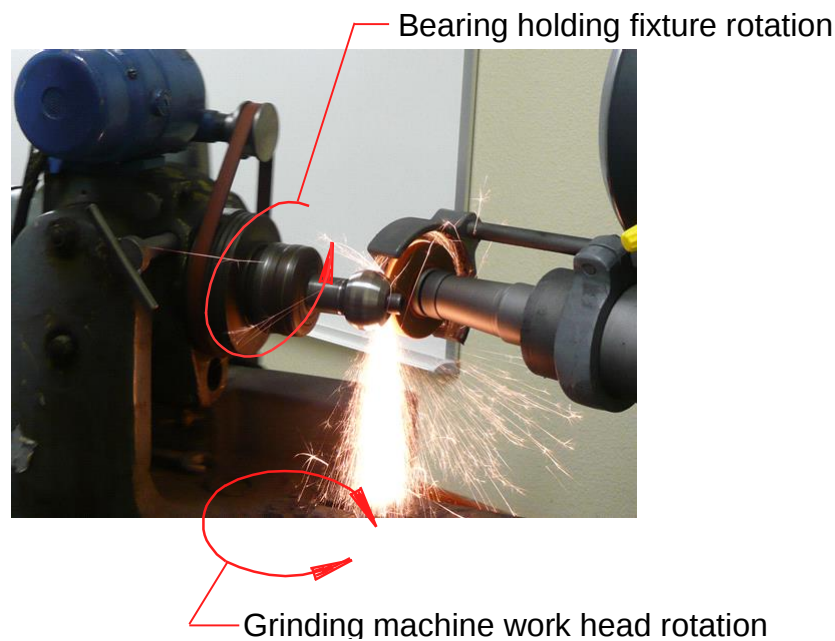


Figure 5 – Modifying outer bearing race

Figure 6a shows the spherical outer bearing race being placed in a slip fit hole in the journal box. Figure 6b shows the unlimited movement of the axle shaft in the journal box with the modified outer bearing race.

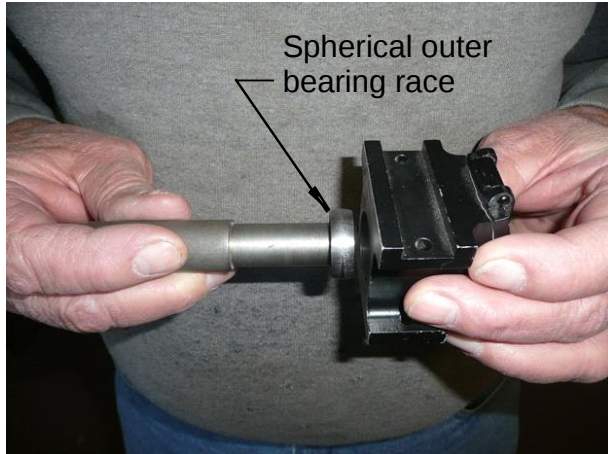


Figure 6a



Figure 6b

Figure 7 shows the completed truck on a table with a 2" x 4" wood block under one wheel while the other 3 wheels are making contact with the table.

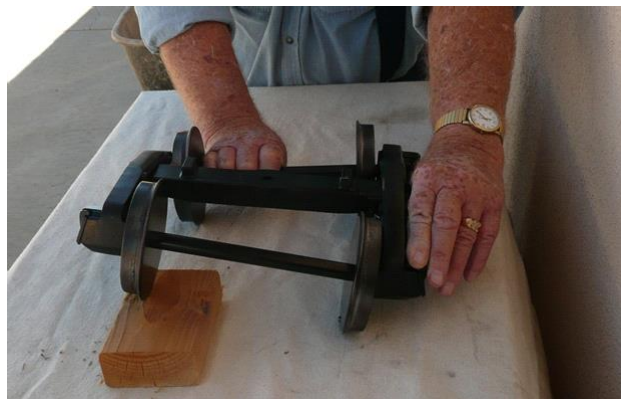


Figure 7 – Truck flexibility